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ABSTRACT

In order to verify claims made by Genevan researchers that linguistic production but not comprehension capabilities distinguish seriators from nonseriators, three tasks were administered to children between the ages of four and eight. Subjects were asked to arrange in order objects varying in size, to describe how the objects differed from each other, and to display comprehension of affirmative and negative comparative and equative constructions. Results failed to support Genevan conclusions. When age differences were minimized, seriators did not differ from nonseriators in the use of absolute or relational terms. However, seriators did display superior linguistic comprehension capabilities. (Author)

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Language Production, Comprehension, and Seriation Capabilities in Children

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Abstract

In order to verify claims made by Genevan researchers that linguistic production but not comprehension capabilities distinguish seriators from non-seriators, three tasks were administered to children between the ages of four and eight. Ss were asked to arrange in order objects varying in size, to describe how the objects differed from each other, and to display comprehension of affirmative and negative comparative and equative constructions. Results failed to support Genevan conclusions. When age differences were minimized, seriators did not differ from non-seriators in the use of absolute or relational terms. However, seriators did display superior linguistic comprehension capabilities.

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Attempts to specify the relationship between language and thinking have resulted in a controversy involving Genevan and Harvard researchers. Whereas Inhelder and Sinclair de Zwart claim that the possession of linguistic structures does not insure that children will be able to perform operational thinking, Bruner argues that acquisition of language underlies cognitive progress. In order to substantiate its position, the Genevan team conducted various experiments, one of which examined relationships between the child's ability to comprehend comparative language, his ability to produce these forms, and his ability to order objects by size. Results indicated that linguistic production but not comprehension was related to seriation. Whereas seriators produced relational terms ("X has more than Y") to describe differences among objects, non-seriators used absolute descriptives ("X has a lot, Y has a little").

The present study was undertaken to examine these findings with English-speaking children and English linguistic forms. The tasks used by the Genevans to assess language capabilities were improved so as to provide better measures of comparative comprehension and production. Statistical tests were performed to determine whether observed differences were significant. Furthermore, the bearing of age on observed differences was checked by separating older from younger seriators.

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Verification of the following claims was sought: (1) the ability to produce comparative language distinguishes seriators from non-seriators; (2) non-seriators unlike seriators produce mostly absolute descriptives; (3) non-seriators as well as seriators possess comparable linguistic comprehension capabilities.

Method

The sample consisted of 40 black and white males and females between the ages of four and eight. All children were from lower middle income families.

Children were tested individually. Three types of tasks were presented to them, one measuring seriation, one eliciting language productions, and one reflecting comparative language comprehension. In the first task, children were given sets of 5 and 8 objects, one set at a time, and they were asked to arrange the objects in order. In the second task, they were given two five-object sets in which size was varied, and they were asked to describe differences among the five objects. In the third task, they were shown four pictures, one at a time. Each picture portrayed five objects arranged in order from big to little. Members of sets were identical otherwise. For each picture, comprehension of four syntactic forms were examined:

affirmative comparative: for example, Bigger than

negative comparative: Not bigger than

affirmative equative: As big as

negative equative: Not as big as

Each form filled slots in questions of the following type: "Which car is _____ Henry? Are there any others that are _____ Henry?" The second question was repeated until the child said, "No." The comparison object, Henry in this case, consisted of a cutout identical to the middle object in each array. This fact was pointed out to Ss before questions were presented.

Results

Performances in the seriation and comprehension tasks were subjected to an analysis of variance to assess the effects of the subject variables, age, sex, and ethnic group. Results revealed no differences as a function of sex or race. However, main effects of age were significant in both analyses ($p < .01$ for seriation, $p < .05$ for comprehension). These results are presented in Table 1 and Figure 2.

In order to shed light on the relationship between language production, language comprehension, and seriation, the four and five year olds were divided into two groups, those who passed all the size ordering tasks ($N = 5$) and those who failed all of them ($N = 9$). Only the four and five year olds were used in order to minimize the effects of age. (By six most of the Ss could seriate.) When various characteristics of the descriptions produced by these two groups were compared, few linguistic production differences were evident. These comparisons are presented in Table 2. None of the mean differences was significant for the following production measures: number of descriptive statements related to size, number of inflected adjectives, number and proportion of full comparative statements, number of absolute descriptives, and number of multiple adjective descriptives ($t < 1$ for the first 5 measures, and $t = 1.24$, $df = 12$, $p > .05$, for the last measure).

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In contrast to the absence of production differences, when scores on the comprehension task were compared, seriators clearly outperformed non-seriators ($t = 2.92$, $df = 12$, p .01). See Table 2 for these values.

To determine whether age made any difference in comparisons of the extent to which Ss comprehended and produced full comparative forms, scores of younger seriators and non-seriators were compared to scores of older seriators. These results are presented in Table 3. Whereas the proportions of descriptives expressed as full comparatives were identical for the two younger groups (.21), a greater mean proportion was observed for the older group (.65). This finding suggests that failure to equate the two groups for age might result in inflated production means for seriators since this would be the group comprised of more older Ss. Such inflation was not apparent in the comparison of comprehension scores. Older seriators achieved a mean only slightly above that of younger seriators (8.3 vs. 8.2).

Discussion

Results of the present study contrast in several ways with those reported by Genevan researchers. It was not the production of comparative language or absolute descriptives which distinguished seriators from non-seriators but rather the comprehension of comparative forms. (I might point out that this should not surprise those who believe that possession of cognitive structures, not skill in producing responses, is the more important indicator of intellectual progress.) In the present study, measures of linguistic production proved significant as a basis for separating seriators from non-seriators only when age was disregarded, that is, when older as well as younger seriators were compared to non-seriators. Thus, it may be that Sinclair de Zwart's detection of production differences occurred because she did not control for age differences and her sample of seriators was substantially older than her non-seriators. Sinclair de Zwart's failure to find a relationship between language comprehension and seriation most probably resulted because her task was too simple and did not tap comprehension competence with comparative forms. The measure of comprehension adopted in the present study differed from hers in that four types of constructions were examined with five- rather than two-object sets.

One part of Sinclair de Zwart's study not included in the present investigation consisted of an attempt to teach non-seriators to produce comparative forms. Though successful, she reports that this failed to facilitate operational progress in 90% of the Ss. This failure is perhaps not surprising in view of present findings that production of comparatives does not really distinguish seriators from non-seriators when age effects are minimized. Also, it may not be surprising in light of the likelihood that teaching children to produce forms does not guarantee that meanings underlying the forms will be fully acquired. In fact, it is likely that newly learned constructions will initially be assimilated to existing semantic structures and so treated as synonymous with old forms, as Slobin suggests. To be effective, perhaps instruction must entail teaching children the meanings of terms and forms. Results of the present study indicating that comprehension capabilities distinguish seriators from non-seriators support this possibility.

One inadequacy of the present study must be mentioned, that regarding the index of seriation utilized. In contrast to Sinclair de Zwart's study, only the ability to order objects, not the ability to insert additional items into an ordered array was examined.

This latter task is the one used to distinguish Ss who have attained an operational concept of a series from those who possess merely an intuitive representation. Thus, it may be that the group of younger seriators identified in the present study lacked true operativity. This possibility needs to be checked with the insertion task added to the ordering task to clarify whether conclusions of the present study hold in general or only for the distinction between intuitive seriators and non-seriators.

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Table 1

Mean Number of Responses as a Function of Age

Measures	Age 4	5	6	7	8
Seriation (max = 5)[a]	.88	1.88	3.50	4.13	4.50
Comparative and Equative Comprehension (max = 16)[b]	4.88	6.63	7.38	7.88	8.75
Number of Full Comparatives Produced[c]	2.88	4.25	6.63	6.25	5.13
Total Number of Descriptives Produced[c]	19.00	17.00	14.25	11.13	7.50
Proportions of Descriptions in Full Comparative Form[c]	.18	.27	.53	.53	.75

[a]Note: MSE (20) = 1.525

[b]Note: MSE (20) = 4.95

[c]Values calculated only on descriptions of five objects, not three-object comparisions.

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Table 2

Mean Production and Comprehension Scores of 4 and 5 Year Old Seriators and Non-Seriators in Response to Objects Differing in Size

	Seriators[a]		Non-Seriators[b]	
Production Measures[c]	Mean	S.D. (Range)	Mean	S.D. (Range)
1. Total number of descriptives	35.4	13.35 (22 - 57)	29.6	8.47 (19 - 44)
2. Number of inflected adjectives ("-er," "-est")	14.0	9.06 (1 - 23)	10.8	10.51 (0 - 31)
3. Number of full comparatives	7.4	6.58 (0 - 15)	4.9	5.60 (0 - 15)
4. Proportion of total in comparative form	.21	.20 (.00 - .45)	.21	.29 (.00 - .79)
5. Number of absolute descriptives (with or without inflections)	23.6	15.40 (9 - 47)	23.1	12.69 (2 - 42)
6. Number of adjective combinations (e.g., "real bigger")	13.6	13.58 (0 - 36)	5.4	6.67 (0 - 19)
Comprehension Measure	8.2	1.30 (7 - 10)	4.8	2.39 (1 - 8)

[a] Two seriators were 4 and three were 5 years of age.

[b] Six non-seriators were 4 and three were 5 years of age.

[c] Values calculated on descriptives for both 3- and 5-object comparisons of plugs and pencils.

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Table 3

Mean Production and Comprehension Scores of Seriators and Non-Seriators as a Function of Age

	Proportion of Full Comparatives Produced[a]	Number of Comparatives Comprehended
Younger Non-Seriators (N = 9; age 4 - 5)	.22	4.8
Older Non-Seriators (N = 2; age 6 - 7)	.21	6.5
All Non-Seriators	.22	5.1
- - -		
Partial Seriators (N = 3; age 5 - 6)	.34	4.0
- - -		
Younger Seriators (N = 5; age 4 - 5)	.19	8.2
Older Seriators (N = 21; age 6 - 8)	.65	8.3
All Seriators	.56	8.3

[a]Values calculated on descriptives for 5-object comparisons of plugs and pencils only.

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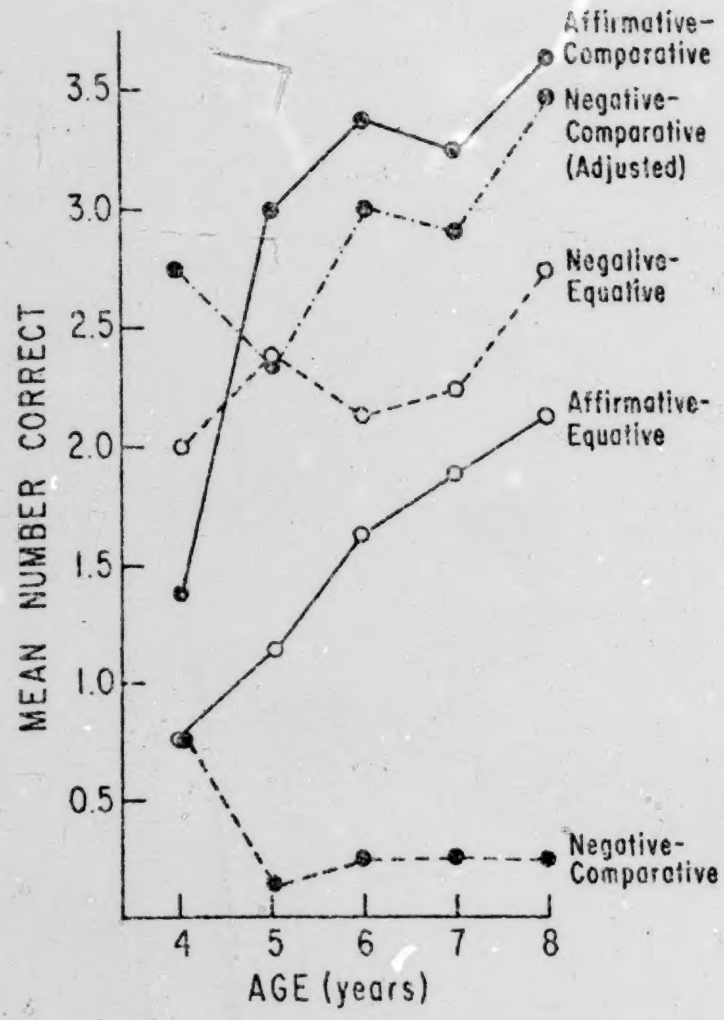

Fig. 2. Mean number of correct responses on the comprehension task as a function of age and comparative construction (maximum = 4)